Specification Amendments

Please replace the abstract with the new abstract enclosed on the separate attached sheet.

Please add the following paragraph beginning on page 1, line 1, as follows:

PRIORITY CLAIM

This application is a nationalization of PCT International Application No. PCT/US04/28890, filed September 3, 2004, which claims benefit of U.S. Provisional Patent Application No. 60/500,041, filed September 4, 2003, and U.S. Provisional Patent Application No. 60/500,208, filed September 4, 2003.

Please replace the paragraph beginning on page 15, line 17, with the amended paragraph, as follows:

A pair of bearings 174 and 178 can ~~carrying~~ carry the shaft 150, and can be disposed on opposite sides of the slots 158 and impeller blades 170. An intermediate member 182 can be disposed between the pair of bearings 174 and 178, and can define a volute 186 around the shaft 150 at the slots 158.

Please replace the paragraph beginning on page 17, line 17, with the amended paragraph, as follows:

Referring to FIG. 5f, an end surface 230 of the hollow cavity 154 proximate the slots 158 can have a protrusion 234 to guide flow to the at least one ~~slots~~ slot. The protrusion 234 can have a concave curvature, as shown. In addition, the walls of the hollow cavity 154 can have similar curvature leading into the slots.

Please replace the paragraph beginning on page 10, line 29 with the amended paragraph as follows:

Referring to FIG. 1b, another pump 10b is shown that is similar in many respects to the pump 10a of FIG. 1a, and described above. The pump 10b can include the wiper

44 disposed between a pair of spaced-apart discs 52b and 52c rotatably disposed in the pump housing. The discs 52b and 52c include opposing disc surfaces 48h and 48i. The wiper 44 can be disposed between the discs 52b and 52c and can wipe or direct the fluid from both disc surfaces 48h and 48i. The discs 52b and 52c can be interconnected by a common shaft 120 so that they rotate together at the same speed, and can be turned by the same motor. Alternatively, the discs 52b and 52c can be rotated separately, or at different speeds, to enhance mixing of the fluid. The discs 52b and 52c, or the disc surfaces 48h and 48i, can be similar to facilitate manufacturing, facilitate laminar flow and minimize recirculation. For example, the discs or opposing disc surfaces 48h and 48i can have the same diameter and the same surface roughness, can be planar, and can be parallel to one another. Alternatively, the discs or opposing disc surfaces 48h and 48i can have different diameters, different surface roughness, can be non-planar, and/or can be non-parallel to increase recirculation or mixing, as discussed above.

Please replace the paragraph beginning on page 10, line 21 with the amended paragraph as follows:

In addition, the inlet and outlet channels, or the inlet and outlet, of the pump can be configured to optimize performance or to accommodate particular applications. For example, the inlet and outlet channels 30 and 34 can be oriented parallel with the disc surface 48 and orthogonal to one another, as shown in FIG. 1a. As another example, the inlet and outlet channels 30b and 34b can be oriented at an obtuse angle with respect to one another to maximize the disc surface 48, as shown in FIG. 2d. Alternatively, the inlet and outlet channels can be oriented perpendicularly, as indicated by dashed lines at 18b in FIG. 1a, or inclined, as indicated by dashed lines at 18a in FIG. 1a, with respect to the disc surface to suit particular applications.

Please replace the paragraph beginning on page 16, line 5 with the amended paragraph as follows:

In addition, the hollow cavity 154 or inner surface 166 can be configured to increase momentum transfer from the inner surface to the fluid, and to help direct or push

the fluid through the hollow cavity. For example, the hollow cavity or inner surface can include one or more ridges 200 extending from the inner surface 166 and oriented parallel with the axis of rotation 162 of the shaft, as shown in FIG. 5c. Similarly, the hollow cavity or inner surface can include one or more channels 204 extending into the inner surface and oriented parallel with the axis of rotation of the shaft, as shown in FIG. 5c. As another example, the hollow cavity or inner surface can include one or more spiral blades 208 extending from the inner surface, or one or more spiral channels 210 extending into the inner surface, as shown in FIG. 5d. The spiral ridges or channels can extend around the inner surface and along the length of the inner surface. The ridges or channels can have rectilinear cross-sections, as shown, to increase momentum transfer. It is of course understood that the ridges or channels can have curved or inclined cross-sections to reduce turbulence or mixing. Furthermore, the inner surface 166 (FIG. 5a) can have random or patterned surface roughness, as described above.

Please replace the paragraph beginning on page 17, line 11 with the amended paragraph as follows:

In addition, the slots 158 or blades 170 can be configured to enhance heat transport near the surface. For example, the leading or trailing edges, 218 or 214 respectively, can have a similar or different surface roughness.